NASA Facts

National Aeronautics and
Space Administration
Kennedy Space Center

Node 1: International Space Station Launch Preparations

Preflight processing of Node 1 and the two Pressurized Mating Adapters (PMAs) will take place in Kennedy Space Center's Space Station Processing Facility (SSPF), a state-of-the-art facility located in the KSC Industrial Area.

Space Station Processing Facility

The SSPF represents the largest construction project at KSC since the Apollo era of the 1960s. Groundbreaking began in March 1991, and the 457,000-square-foot (42,455-square-meter) building was dedicated on June 23, 1994.

Although the SSPF is intended for processing of International Space Station elements, it already has accommodated a variety of payloads. The first payload processed through the facility was the Russian-built Docking Module in 1995 that was subsequently carried aboard the Space Shuttle to be permanently attached to the Mir Space Station. Other Shuttle payloads that are currently being processed in the SSPF include the Japanese Manipulator Flight Demonstration (MFD) and Technology Applications and Science (TAS) payloads assigned to STS-85 and the U.S. Microgravity Payload-4 (USMP-4) that will fly on STS-87.


The 457,000-square-foot Space Station Processing Facility was dedicated in June 1994

Major features of the SSPF include:

- A 46,000-square-foot (4,273-square-meter) high bay

- A 17,000-square-foot (1,579-square-meter) intermediate bay

- A 5,000-square-foot (466-square-meter) air lock

- 19 off-line laboratories, nine control rooms and office space for customer use

- Clean work areas (100,000 Class) (the high and intermediate bays; off-line labs)

- Bridge cranes in the high bay (two 30-ton/30,480-kilogram capacity) and intermediate bay (two five-ton/5,080-kilogram capacity).
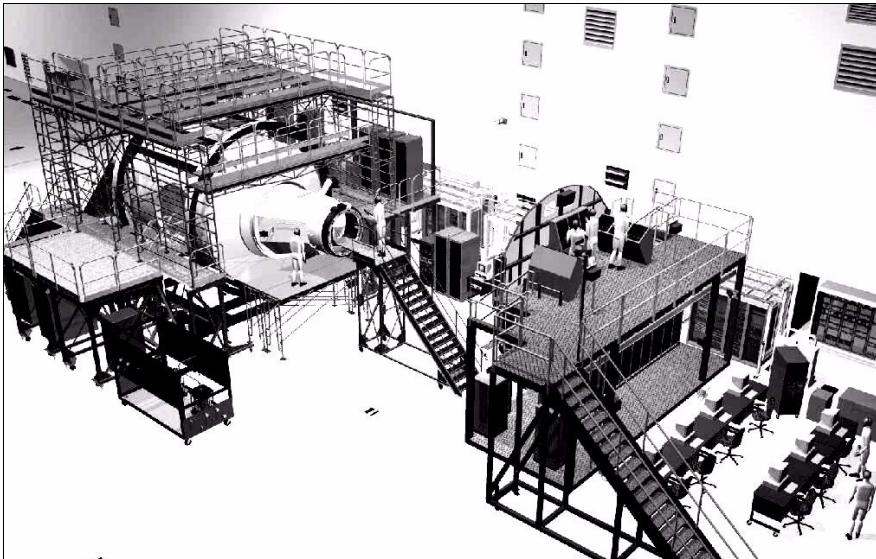
Illustration of Node 1 and work stands in the SSPF high bay

Preflight checkout of Node 1 will take place in the SSPF high bay, which features an air-bearing compatible floor. KSC designed and built much of the ground support equipment (GSE) located here, including work stands and the Launch Package Integration Stand (LPIS) - the equivalent of the Cargo Integration Test Equipment (CITE) stand used for many years in the Operations and Checkout Building, but moveable on its air-bearing supports. Like the CITE stand, the LPIS will be used to verify mechanical and electrical connections between the payload and the Shuttle orbiter. Other features of the high bay include stub-ups - electrical outlets in the floor rather than on the wall; tunnels underneath the floor to make it easier to perform maintenance without impacting operations and catwalks to access cable trays easily and efficiently.

The high bay features eight "footprints," four on each side of a central transfer aisle. Each footprint is outfitted with facility services through stub-ups accessed in the floor for interconnection to payload ground support equipment that will be used for testing and processing of payloads. Footprints 3 and 5 will be used for processing of the Node and the PMAs.

In the future, experiment racks for utilization flights will be prepared in the intermediate bay of the SSPF. Also located here are a food preparation area, a flight crew equipment storage area, and an area for storing spare parts. A piece of ground support equipment called the Payload Test and Checkout System will allow the racks to be tested before being installed in the Mini-Pressurized Logistics Module (MPLM) that will begin a series of flights starting in 1999. Another piece of KSC-designed GSE that will be used to install the racks in the module is the Rack Insertion Device (RID), which can perform

the task repeatedly with maximum efficiency. The RID saw first use in 1996, when it was used to support preflight preparation of a space station experiment rack prototype that later flew on STS-79.

Processing Flow

Three KSC managers with a combined 50 years of space program experience are leading the KSC team preparing for Node 1 arrival and Flight 2A launch site processing. The formation of a three-member team to lead the processing is in itself a first at KSC and reflects the challenges of such a complex project as the International Space Station. There is a NASA payload manager; a payload manager for McDonnell Douglas, the Payload Ground Operations Contractor (PGOC) at KSC; and a payload manager representing Space Station Prime Contractor Boeing.

Each lead provides a different launch site function for the International Space Station program. The NASA/KSC role and that of the PGOC are to serve as host to the prime contractor, Boeing, during their off-line operations. The off-line activities are in the initial stages of launch site processing where Boeing has the lead for the acceptance and checkout of Node 1 and PMAs 1 and 2. Once the hardware is turned over to NASA, then the lead roles will shift and NASA-KSC/PGOC will be responsible for Shuttle integration activities with Boeing providing the required support.
The Node and PMAs 1 and 2 will undergo acceptance and checkout testing in the Element Rotation Stand (see illustration). Preflight work will include:

- Completion of factory assembly & checkout

- Node 1 and PMA 1 acceptance testing

- Cargo Element Integration Test (CEIT)

- A communication End-To-End test with Mission Control in Houston

- Checkout of the Node 1 and PMAs for air leaks

- Installation and survey of optical targets -- the Node/PMA assembly will feature the Canadian-supplied Space Vision System navigation targets.

- Toxicology test, or the "new car smell" test -- Samples of the air inside the Node will be collected throughout its stay at KSC for trending purposes. This is a standard procedure for new flight hardware.

- A payload/orbiter interface verification test (IVT) at the pad -- Unlike most IVTs, which are performed after the payload has been installed in the orbiter's payload bay, the IVT of the Node 1/PMAs assembly will be conducted with it held outside the payload bay by the Payload Ground Handling Mechanism, located in the Payload Changeout Room at the pad.